

CLAIM AMENDMENTS

Please amend Claims 1, 2, 4, 6-14, 16, 20, 21, 23, and 26, as follows:

1. (Currently Amended) An image processing method for detecting a direction of an image including a character area, inputted into a computer, said method comprising:

a binary image generation step of generating a binary image of said input image based on a result of a differential processing of the input image;

a tile image generation step of generating a tile image that comprises a plurality of tiles, wherein a value of each tile in the tile image is generated based on ~~by applying a predetermined value to tiles, each corresponding to~~ a predetermined size area in said binary image;

a character area extraction step of extracting an area in said binary image, corresponding to an area in a circumscribed rectangle surrounding connected pixels having the same value in said tile image, as a character area; and

a direction detection step of recognizing a direction of characters included in said character area and thereby detecting the direction of said image.

2. (Currently Amended) The image processing method according to claim 1, wherein at said binary image generation step, the binary image is generated with image area flags having a value 1 corresponding to a pixel of the differential processed image equal to or greater than a predetermined value or a value 0 corresponding to a pixel of the differential processed image less than the predetermined value,

and at said tile image generation step, the tile image is generated with a tile having a value 1 where the number of image area flags having the value 1 is equal to or

greater than a predetermined threshold value, and a tile having a value 0 where the number of image area flags having the value 1 is less than the predetermined threshold value.

3. (Previously Presented) The image processing method according to claim 1, further comprising: a character extraction step of extracting the respective characters included in said character area extracted at said character area extraction step; and

a character recognition step of recognizing a direction of said characters extracted at said character extraction step,

wherein at said direction detection step, the direction of said character area is detected based on the result of recognition of the direction of said characters included in said character area.

4. (Currently Amended) ~~{The }~~An image processing method for detecting a direction of an image including a character area, inputted into a computer, said method ~~{according to claim 1, further }~~comprising:

a binary image generation step of generating a binary image of said input image;

a tile image generation step of generating a tile image that comprises a plurality of tiles, wherein a value of each tile in the tile image is generated based on a predetermined size area in said binary image;

a character area extraction step of extracting an area in said binary image, corresponding to an area in a circumscribed rectangle surrounding connected pixels having the same value in said tile image, as a character area;

a determination step of determining whether or not said character area is an inverted image based on the binary image of said image; ~~{and }~~

an inversion processing step of inverting black and white components of said binary image if it is determined at said determination step that said character area is an inverted image; and

a direction detection step of recognizing a direction of characters included in said character area of the binary image inverted in said inversion processing step, and thereby detecting the direction of said image.

5. (Previously Presented) The image processing method according to claim 2, wherein at said tile image generation step, plural tile images are generated using plural different threshold values,

and wherein at said character area extraction step, the plural tile images are compared with each other and the character area included in said image is extracted.

6. (Currently Amended) The image processing method according to claim 1, wherein a resolution of said tile image is lower than a resolution of the binary image~~[a low resolution binary image generated by counting said binary image, generated by differentiating said image, by a small area]~~.

7. (Currently Amended) The image processing method according to claim 1, wherein the value of each tile in said tile image is determined based on lines included in the predetermined size area in said binary image~~[a low resolution differential image generated by counting differential information of said image by a small area]~~.

8. (Currently Amended) The image processing method according to claim ~~[6]~~1, wherein at said character area detection step, an area in said image, corresponding to the

connected ~~[pixels]~~tiles extracted from said ~~[low resolution]~~tile image, is extracted as a character area.

9. (Currently Amended) The image processing method according to claim 6, wherein at said tile image generation step, plural low resolution tile images are generated using plural different threshold values.

10. (Currently Amended) The image processing method according to claim 9, wherein at said character area extraction step, said character area is extracted by comparing connected ~~[pixels]~~tiles extracted from said plural low resolution tile images~~[are compared with said plural low resolution images and said character area is extracted]~~.

11. (Currently Amended) The image processing method according to claim 6, wherein at said character area extraction step, said low resolution tile image is divided into meshes, and said character area is extracted based on distribution of pixels within each mesh area.

12. (Currently Amended) The image processing method according to claim 11, wherein said character area extraction step includes a selection output step of selectively outputting a character area extracted using connected pixels extracted from said low resolution tile image and a character area determined based on the distribution of pixels within each mesh area.

13. (Currently Amended) An image processing apparatus comprising:
input means for inputting an image including a character area;

binary image generation means for generating a binary image of said input image based on a result of a differential processing of the input image;

tile image generation means for generating a tile image that comprises a plurality of tiles, wherein a value of each tile in the tile image is generated based on ~~by applying a predetermined value to tiles, each corresponding to~~ a predetermined size area in said binary image;

character area extraction means for extracting an area in said binary image, corresponding to an area in a circumscribed rectangle surrounding connected pixels having the same value in said tile image, as a character area; and

direction detection means for recognizing a direction of characters included in said character area and thereby detecting the direction of said image.

14. (Currently Amended) The image processing apparatus according to claim 13, wherein said binary image generation means generates the binary image with image area flags having a value 1 corresponding to a pixel of the differential processed image equal to or greater than a predetermined value or a value 0 corresponding to a pixel of the differential processed image less than the predetermined value,

and said tile image generation means generates the tile image with a tile having a value 1 where the number of image area flags having the value 1 is equal to or greater than a predetermined threshold value, and a tile having a value 0 where the number of image area flags having the value 1 is less than the predetermined threshold value.

15. (Previously Presented) The image processing apparatus according to claim 13, further comprising character extraction means for extracting the respective characters included in said character area extracted by said character area extraction means,

wherein said direction detection means recognizes a direction of the respective characters, and detects the direction of said character area based on the result of recognition.

16. (Currently Amended) ~~[The]~~An image processing apparatus for detecting a direction of an image including a character area, inputted into a computer, said apparatus~~[according to claim 13, further]~~ comprising:

binary image generation means for generating a binary image of said input image;

tile image generation means for generating a tile image that comprises a plurality of tiles, wherein a value of each tile in the tile image is generated based on a predetermined size area in said binary image;

character area extraction means for extracting an area in said binary image, corresponding to an area in a circumscribed rectangle surrounding connected pixels having the same value in said tile image, as a character area;

determination means for determining whether or not said character area is an inverted image based on the binary image of said image;~~[and]~~

inversion processing means for inverting black and white components of said binary image if said determination means determines that said character area is an inverted image; and

direction detection means for recognizing a direction of characters included in said character area of the binary image inverted in said inversion processing means, and thereby detecting the direction of said image.

17. (Previously Presented) The image processing apparatus according to

claim 13, wherein said tile image generation means generates plural tile images using plural different threshold values,

and wherein said character area extraction means extracts the character area included in said image using the plural tile images.

18. (Previously Presented) The image processing apparatus according to claim 13, wherein said character area extraction means divides said tile image into meshes, and extracts said character area based on distribution of pixels within each mesh area.

19. (Previously Presented) The image processing apparatus according to claim 18, wherein said character area extraction means includes selection output means for selectively outputting a character area extracted using connected pixels extracted from said tile image and a character area determined based on the distribution of pixels within each mesh area.

20. (Currently Amended) A program for a computer to execute:

a binary image generation procedure of generating a binary image of an input image including a character area based on a result of a differential processing of the input image;

a tile image generation procedure of generating a tile image that comprises a plurality of tiles, wherein a value of each tile in the tile image is generated based on ~~[by applying a predetermined value to tiles, each corresponding to]~~ a predetermined size area in said binary image;

a character area extraction procedure of extracting an area in said binary image, corresponding to an area in a circumscribed rectangle surrounding connected pixels having the same value in said tile image, as a character area; and

a direction detection procedure of recognizing a direction of characters included in said character area and thereby detecting the direction of said image.

21. (Currently Amended) The program according to claim 20, wherein at said binary image generation procedure, the binary image is generated with image area flags having a value 1 corresponding to a pixel of the differential processed image equal to or greater than a predetermined value or a value 0 corresponding to a pixel of the differential processed image less than the predetermined value,

and at said tile image generation procedure, the tile image is generated with a tile having a value 1 where the number of image area flags having the value 1 is equal to or greater than a predetermined threshold value, and a tile having a value 0 where the number of image area flags having the value 1 is less than the predetermined threshold value.

22. (Previously Presented) The program according to claim 20, further to execute a character extraction procedure of extracting the respective characters included in said character area extracted at said character area extraction procedure,

wherein at said direction detection procedure, a direction of the respective characters is recognized, and the direction of said character area is detected based on the result of recognition.

23. (Currently Amended) ~~{The}~~A program for a computer~~[according to claim 20, further]~~ to execute:

a binary image generation procedure of generating a binary image of an input image including a character area;

a tile image generation procedure of generating a tile image that

comprises a plurality of tiles, wherein a value of each tile in the tile image is generated based on a predetermined size area in said binary image;

a character area extraction procedure of extracting an area in said binary image, corresponding to an area in a circumscribed rectangle surrounding connected pixels having the same value in said tile image, as a character area;

a determination procedure of determining whether or not said character area is an inverted image based on the binary image of said image;~~and~~

an inversion processing procedure of inverting black and white components of said binary image if it is determined at said determination procedure that said character area is an inverted image; and

a direction detection procedure of recognizing a direction of characters included in said character area of the binary image inverted in said inversion processing procedure, and thereby detecting the direction of said image.

24. (Previously Presented) The program according to claim 20, wherein at said tile image generation procedure, plural tile images are generated using plural different threshold values,

and wherein at said character area extraction procedure, the plural tile images are compared with each other and the character area included in said image is extracted.

25. (Previously Presented) The program according to claim 20, wherein at said character area extraction procedure, said tile image is divided into meshes, and said character area is extracted based on distribution of pixels within each mesh area.

26. (Currently Amended) The program according to claim 25, wherein said

character area extraction procedure includes a selection output procedure of selectively outputting a character area extracted using connected pixels extracted from said ~~flow~~
~~resolution~~tile image and a character area determined based on the distribution of pixels within each mesh area.

27. (Previously Presented) A computer-readable storage medium holding the program according to claim 20.